

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

-----: Atty Dkt#: ATL-P1  
In Re U.S. Patent Application Of  
SCALLIE, BOUTELIER  
Serial No.: 10/011,027  
Filing Date: November 2, 2001  
Title: VIRTUAL REALITY GAME SYSTEM USING  
PSEUDO 3D DISPLAY DRIVER  
-----:



AFFIDAVIT OF DAVID PAULL UNDER 37 C.F.R. 132

To: Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

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The undersigned, DAVID PAULL, declares as follows:

1. I received my technical training in computer graphics application programming and have an extensive background and experience in this field. I am a software programming consultant to Atlantis Cyberspace, Inc., the assignee of patent rights to the above-identified U.S. Patent Application, and have worked with the named inventors on the invention subject matter of this Application. I submit this Affidavit in support of the patentability of the claims pending before the Examiner in this case.

Patent Application Claims

2. The invention sought to be patented is defined in main Claims 1 and 15, which are amended concurrently herewith to read as follows:

Claim 1:

A method for operating three-dimensional (3D) application software to generate a 3D stereoscopic vision display, wherein the 3D application software is of the type that provides a 3D output signal to a display driver for a 3D graphics rendering device to generate a display output appearing to be three-dimensional for display on a two-dimensional (2D) screen display, comprising:

(a) running the application software in its normal mode to generate the 3D output image signal which is normally sent from the application software to a display driver to a 3D graphics rendering device for generating a 3D display output on a 2D screen display;

(b) intercepting the 3D output signal from the application software and redirecting it to a pseudo driver, wherein said pseudo driver generates from said output signal a left image view signal and a right image view signal that is stereoscopically offset from said right image view signal; and

(c) said pseudo driver providing said left image view signal to a first 3D graphics rendering device and said right image view signal to a second 3D graphics rendering device, and using said first and second 3D graphics rendering devices for separately rendering in tandem left and right image views for display in a 3D stereoscopic vision display device.

Claim 15:

A method of generating a 3D multi-view display operable with three-dimensional (3D) application software of the type that provides a 3D output signal from the application software to a display driver to a 3D graphics rendering device to generate a display output appearing to be three-dimensional on a two-dimensional (2D) screen display and which makes display function calls to a native API display driver to provide the 3D display output to a 2D screen display, comprising:

(a) running the application software on a computer in its normal mode to generate the 3D output signal intended for a 2D screen display;

(b) providing a pseudo 3D display driver that links to the native API display driver for intercepting display function calls to the native API display driver from the application

software and redirecting them through the pseudo 3D display driver in order to generate multiple, separate image views and provide them to respective ones of a corresponding multiple of 3D graphics rendering devices for generating a multi-view 3D display.

Subject Matter Disclosed in the Prior Art

3. Claims 1-20 have been rejected in the Office Action dated March 20, 2003, as unpatentable over the Applicant's own disclosure of prior 3D image display systems such as those offered by nVidia, (dated Year 2000) which enable 3D stereoscopic vision goggles to be operated with standard 3D video games.

4. Stereovision drivers were standardized by nVidia when they released the 10.5 drivers which were the first to include stereovision capabilities. Because nVidia at that time controlled the consumer market, users accepted nVidia approach of using a single cable delivering an interlaced, or pageflipped, stereo image signal. That is, the nVidia display driver generated both the left and right images on a single video generator card sequentially. The two images were then either interlaced, or pageflipped (l,r,l,r,l...), to allow the 2 interlaced images to be sent as a single signal over the same cable. At that time, 2000, most standard computers had only a single 2D monitor, so the nVidia approach was to send the 2 interlaced images to a single video graphics generator card for the 2D monitor. NVidia created their 10.5 drivers for the low end (not the high end) market, and therefore the 2 interlaced images were sent to a single graphics generator card to generate both image display outputs for the left and right eyes of nVidia's relatively inexpensive (\$100) LCD Glasses in which each eye has a filter for a respective one of the two interlaced images sent in the single VGA output. The nVidia stereovision drivers were only compatible with an nVidia-based 3D graphics rendering device.

5. At this same time there were high-end stereovision head mounted displays (HMDs) which were not compatible with nVidia's driver. The HMDs required 2 seperate VGA inputs, one per eye. These HMDs employed two separate computers and specialized software to synchronize them, or two separate 3D graphics rendering devices on a single computer, however,

this method required the original 3D application software to be rewritten to support 2 VGA inputs to the HMD directly. (The Applicant's pseudo driver approach allows for any 3D application software to be made compatible with any 3D graphics rendering devices and any 2-VGA-input HMD without rewriting.) The prior approach resulted in HMDs being rarely used, except for universities, and wealthy research departments. The HMDs were in an entirely different market segment from nVidia, and were not compatible with the nVidia driver which outputted only a single VGA signal rendered by one graphics card.

#### Non-Obviousness of the Claimed Invention Subject Matter

6. The Applicant in the present U.S. Patent Application, which is based on a provisional filing date of November 2, 2000, is believed to be the first to realize the advantage of operating a 3D stereoscopic vision device from standard 2D-display-based games by intercepting the native API signal intended for the standard 2D display device and substituting a pseudo driver that generated separate right and left image viewpoint signals and delivered them to two video graphics generators (cards) in a single computer to render two VGA stereovision outputs for use with HMDs, as defined in amended Claim 1. The idea was also expanded to include a dualhead, or triplehead card in which a single video card has multiple rendering graphics generators, and can therefore provide the multiple VGA outputs. The Applicant's pseudo driver approach allows for any standard game software application to be made compatible with high end 2-VGA HMDs (and other high end multi-input display device), such as used in virtual reality or arcade type systems, or even on any standard personal computer.

7. The Applicant developed a generic way (compatible with different 3D application software) to upgrade any standard (2D monovision) game software application to generate multiple views on multiple rendering devices. More specifically, the Applicant's pseudo driver takes control of the game output rendering process so that it can produce the right and left image viewpoints required by high-end stereovision devices. A stereovision image is formed by two separate images to be displayed to the eyes in which the viewpoints are separated spatially by a small offset amount, just like the eyes, in order to produce a stereoscopic effect.

The Applicant's pseudo driver effectively upgrades the standard game software application to be compatible with a high-end stereovision device that it was previously incompatible with. The pseudo driver renders each viewpoint simultaneously on either multiple video cards, or a single card with multiple devices. Therefore, the pseudo driver incurs no extra time penalty when compared to the nVidia mode of providing two sequentially rendered, interlaced images in one signal to one video card for LCD shutter glasses.

8. The Applicant's pseudo driver can create any viewpoint on any of multiple displays, using the game's own image display data and rendering engine. In a non-obtrusive way, the pseudo driver changes the view, and projection matrices which control the games viewpoint. This is a single place where the pseudo driver can take control of the visuals. Now the pseudo driver can change the position of the virtual camera, in the virtual world. It can also alter the properties of the virtual camera to allow for widescreen for example. For example, The virtual camera's projection matrix, of any game, could be altered to deliver 16:9 aspect ratio. No other data in the game has to be altered. Real world applications include moving the viewpoint for stereovision rendering, and rotating the viewpoint to render accurate triplehead views.

9. The Applicant's approach to using the pseudo driver to generate two separate image display outputs to be rendered by two separate video graphics generators (cards), as defined in amended Claim 15, is also distinguishable from VR Standard VR Caddy driver. VRCaddy is like the nVidia driver in that they also render the left, and then the right images, sequentially, and then output the images as a interlaced, or page flipped, single VGA signal. In contrast, the Applicant's pseudo driver renders the left, and right (or any number of) images simultaneously, if multiple rendering devices are available.

10. The Applicant's pseudo 3D driver system can be used to update any 3D application to render n separate views on n separate rendering devices, beyond the right and left views for a stereovision device. For example, the pseudo driver can be used in the same way to drive triplehead or multihead functionality. The pseudo driver is a high level API driver, and it is

compatible with all capable video cards, which includes triplehead, and multihead cards from other manufacturers. The pseudo driver can handle any configuration of n (any number) rendering devices, which then drive n image displays.

#### Example of Multi-View Display



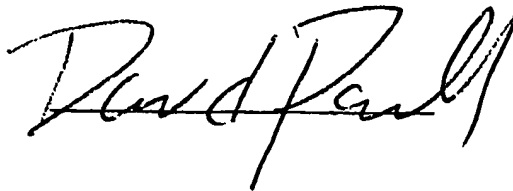
The normal drivers for a 10-view video wall assumes that the user has a single video card, and the 1600x1280 image is stretched to span all the monitors using external hardware. This results in a “aspect ratio” distorted, pixilated image. However, using the applicants pseudo driver, the user can directly drive the 10 VGA signals simultaneously using 10 PCI video cards(or 5 dualhead cards) inside a single computer. This allows a normal 3D game to drive all 10 monitors, each with a correct view, and projection matrix to allow for correct surround vision, simultaneously, on all the available video cards. The Applicants pseudo driver allows each monitor to run in the maximum allowable resolution, typically 1600x1280, allowing for a unprecedented total resolution of 8000x2560.

12. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

AFFIANT: DAVID PAULL

Dated: July 16 2003

At: \_\_\_\_\_

A handwritten signature in cursive script, appearing to read "David Paull", written over a horizontal line.